ACCIDENT INVESTIGATION

ROB YOHO, Lt Col, USAF, MC, CFS

Aircraft Mishap Investigation and Prevention Course

April 2002

OVERVIEW

- Prelude to Disaster-Background
- The Investigation Process
  - Initial Response and Organization
  - Accident Vs Safety Investigation
  - Medical Contributions
  - Cause
- Medical Lessons Learned
- Essentials For Any Investigation
- Investigation Resources
- The Aftermath

BALKAN WAR HISTORY
THE REAL SHORT VERSION

- Yugoslav President Tito dies in 1980
  - Strains emerge within ethnically and religiously diverse federated system
- June 91: Republics of Slovenia & Croatia declare independence
  - War ensues
- Early 92: UN peacekeepers in Croatia
- March 92: Republic of Bosnia and Herzegovina declares independence
  - Bosnian Serbs/Serb Army resist by force

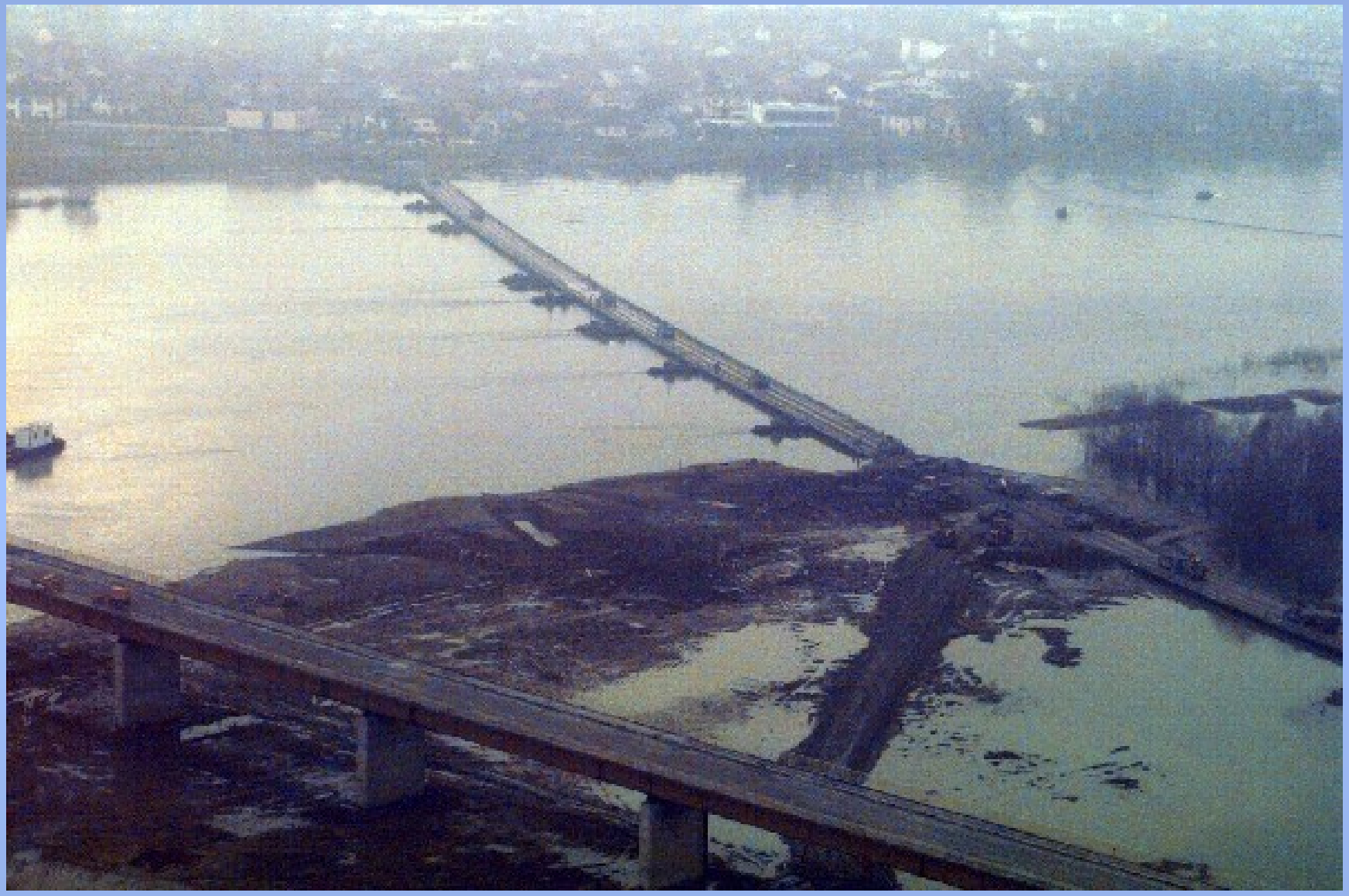
THE SIEGE OF SARAJEVO

HISTORY (CONTINUED)

- Summer 92: UN peacekeepers to Bosnia
  - UN imposed “no-fly zone” begins
- April 94: First NATO air strikes against Serb forces in Bosnia
- June 95: The Scott O’Grady thing
- July 95: Fall of some safe areas
  - London Conference, intensive NATO bom
- November 95: Dayton Peace Accords
  - Implementation Force (IFOR) and civilian aid

IFOR & DEPARTMENT OF COMMERCE MISSION

- IFOR Mission
  - Protect the force, enforce withdrawals, establish separation, enforce cessation of hostilities and
  - Provide secure environment that permits conduct of civil peace implementation function
- US Department of Commerce Mission
  - 3 April 1996: Secretary Brown and team on mission to build trade ties and provide economic assistance to war torn Balkans



THE SAVA RIVER PONTOON BRIDGE CROSSING

NEAR TUZLA AIR BASE, BOSNIA-HERZEGOVINA

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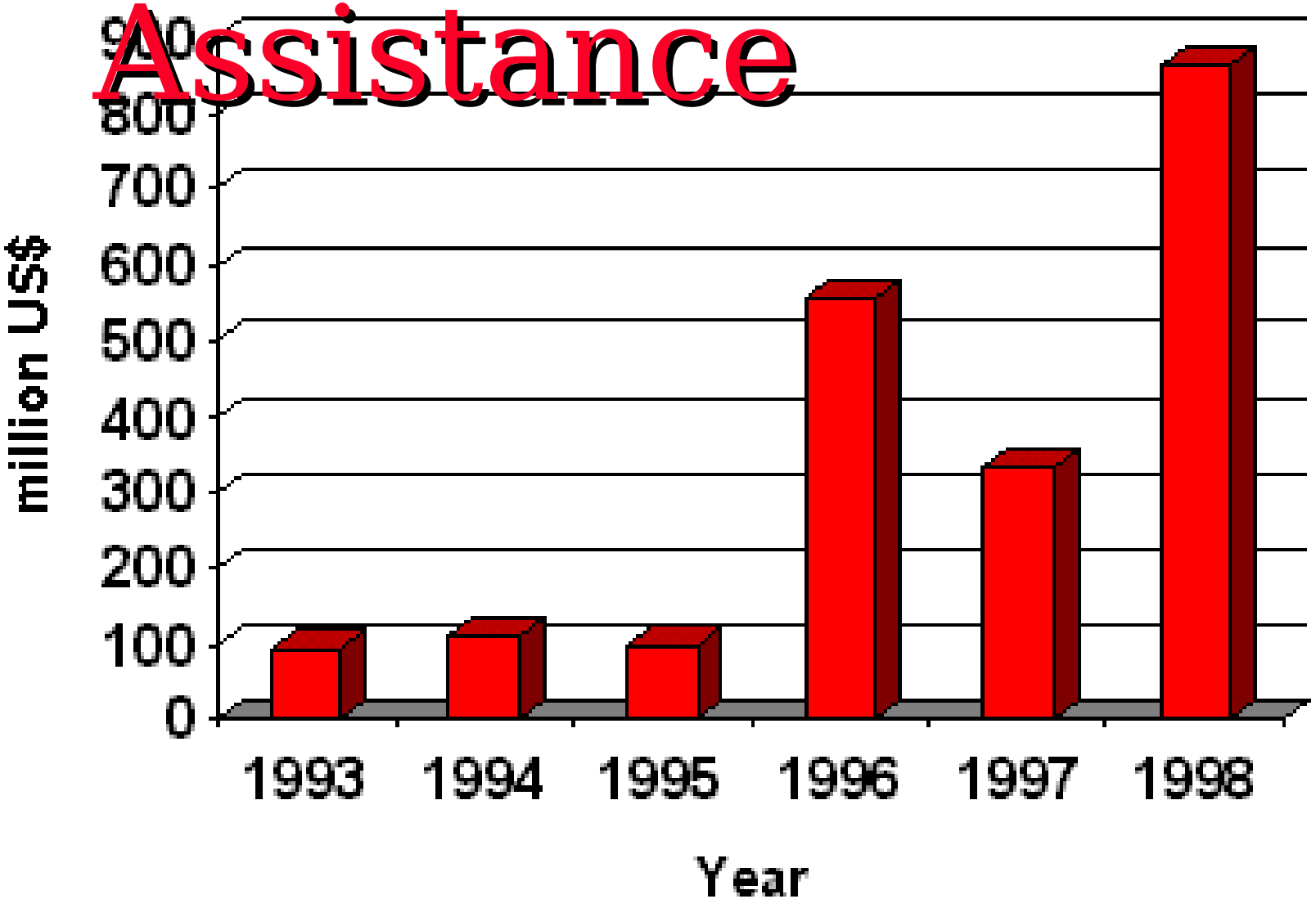
Economic Assistance



THE FLIGHT

- Mission Support: CT-43 out of Ramstein tasked to transport Brown party for 3 days
- Day 1 Schedule: Zagreb - Tuzla - (Split - Tuzla)-Dubrovnik
  - Call sign: IFO 21
  - 29 passengers and 6 crew
- Routing delays through Bosnia corridors

RA
U.S. AIR FORCE

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SWITZ.
AUSTRIA
HUNGARY
SLOVENIA
Bolzano
Ljubljana
Zagreb
Subotica
ROMANIA
Venice
Trieste
Milan
Rijeka
Banja Luka
Novi Sad
FRANCE
Turin
Belgrade
Parma
Bologna
CROATIA
BOSNIA & HERZEGOVINA
Čačak
Genoa
Florence
SAN MARINO
Split
Sarajevo
Niš
Ligurian Sea
Livorno
YUGOSLAVIA
BULGARIA
Dubrovnik
Pristina
Pescara
Adriatic
Sea
Corsica (FR.)
VATICAN CITY
Rome
ITALY
Titograd
MACEDONIA
Bari
ALBANIA
Sassari
Sardinia
Naples
Taranto
Salerno
Lecce
G. di Taranto
Tyrrhenian
Sea
GREECE
Cosenza
Cagliari
MEDITERRANEAN
Ionian
Sea
Palermo
Messina
Sicily
Syracuse
ALGERIA
TUNISIA
Valletta
MALTA
SEA
ITALY AND WEST BALKANS
200 Miles
200 km

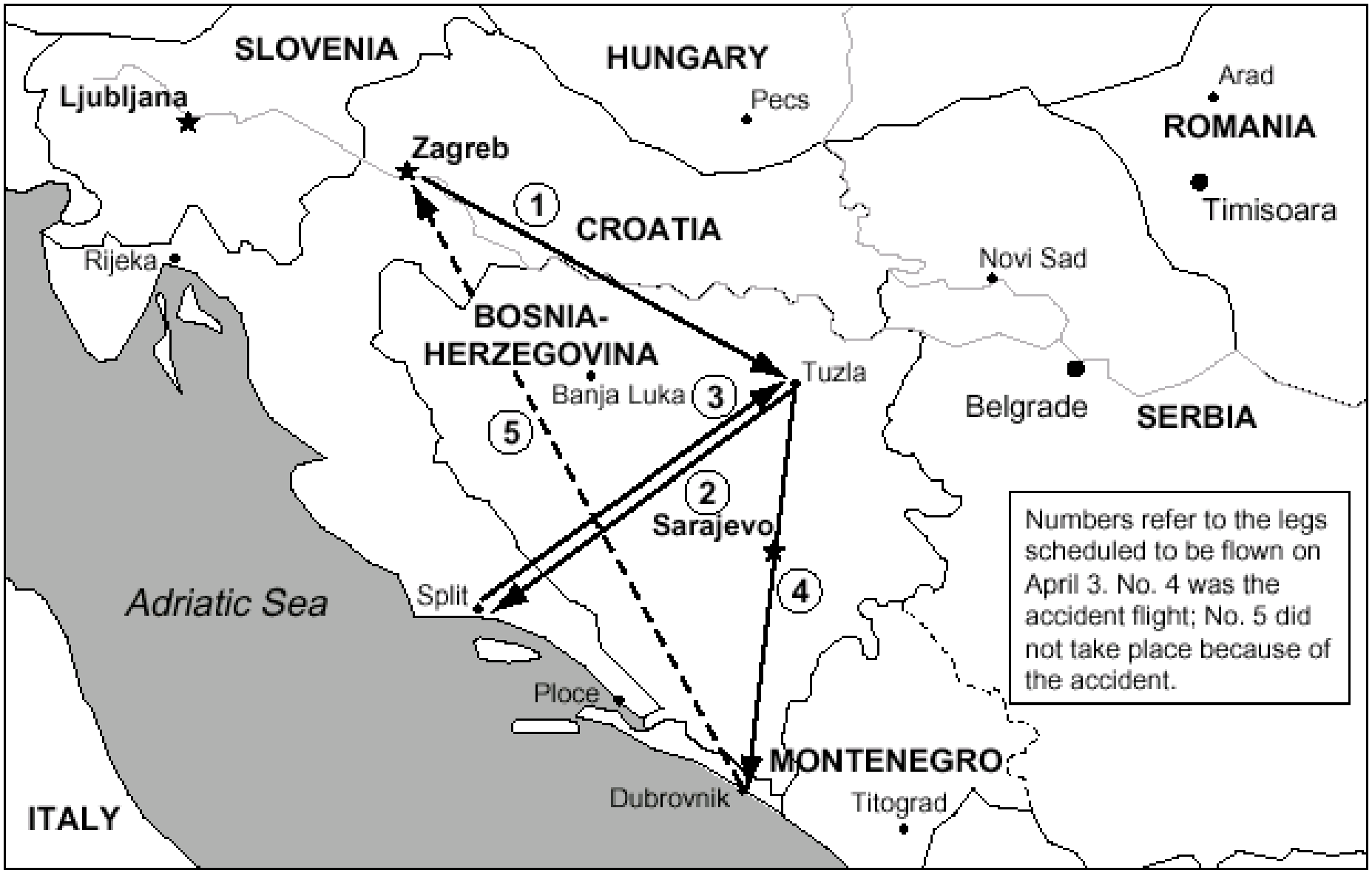

Itinerary for U.S. Air Force CT-43A, April 3, 1996
SLOVENIA
HUNGARY
Ljubljana
Pecs
Arad
ROMANIA
Zagreb
Timisoara
1
CROATIA
Rijeka
Novi Sad
BOSNIA-
HERZEGOVINA
Tuzla
Banja Luka
3
Belgrade
SERBIA
5
2
Sarajevo
Numbers refer to the legs scheduled to be flown on April 3. No. 4 was the accident flight; No. 5 did not take place because of the accident.
Adriatic Sea
Split
4
Ploce
MONTENEGRO
Dubrovnik
Titograd
ITALY
Source: U.S. Air Force

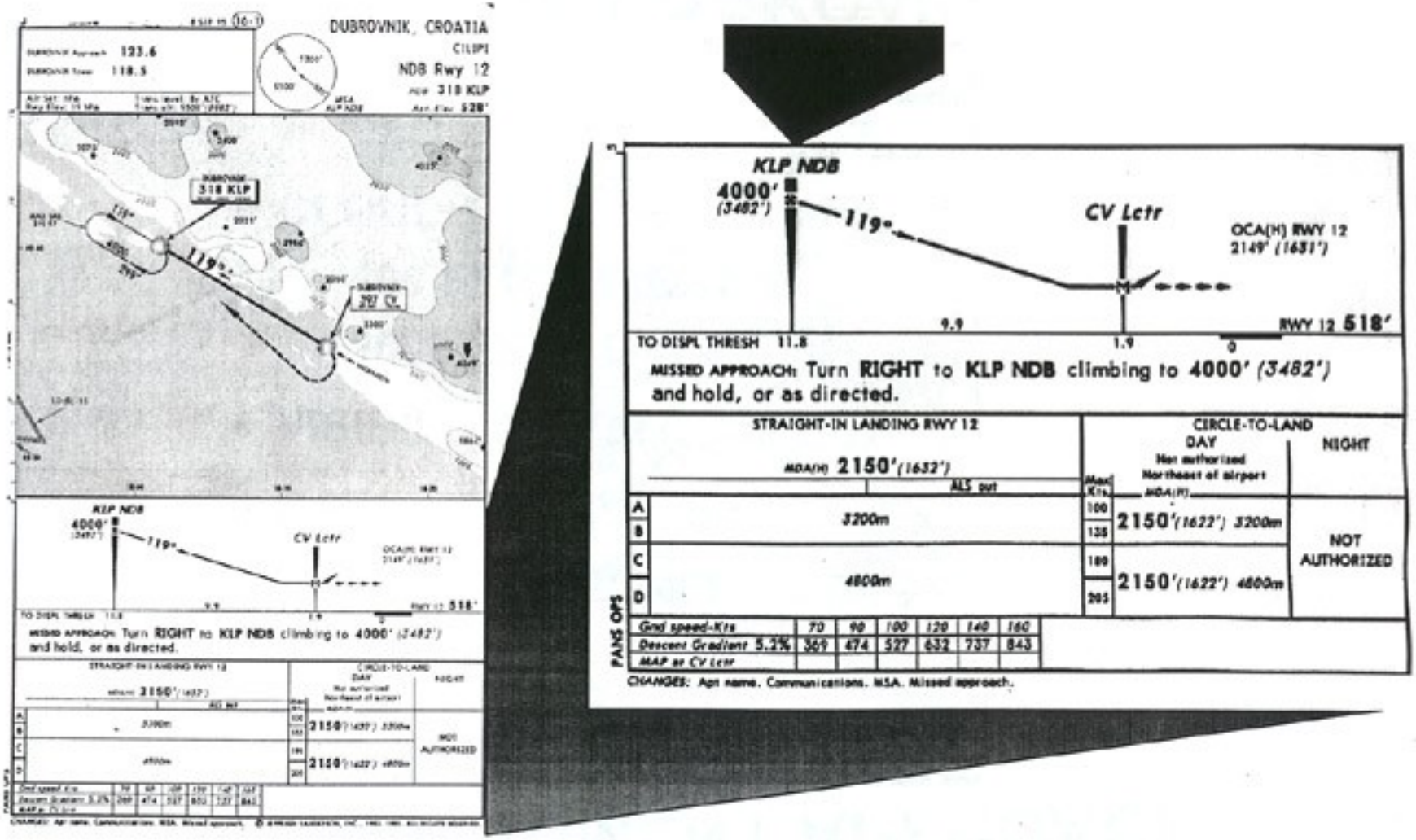
Figure 1

BOSNIA AND HERZEGOVINA
CROATIA
OTOK ŠIPAN
RT GRUJ
NDB
DUBROVNIK
DUBROVNIK
VOR DME
DUBROVNIK
Dikličí
Staro Selo
Mosko
Grab
Uskoplje
Grudo
MONTENEGRO
CROATIA
OŠTRI RT
aerial cable
1110
(200)
415
(200)
aerial cable
aerial cable
1422
(225)
dam
1387
(405)
aerial cable
1526
(315)
aerial cable
YH
BN
YG
BM
BM
CM
WARNING
Flights into or within YUGOSLAVIA are prohibited without prior clearance. Flights outside airways and corridors are prohibited.
60
1045 E
30

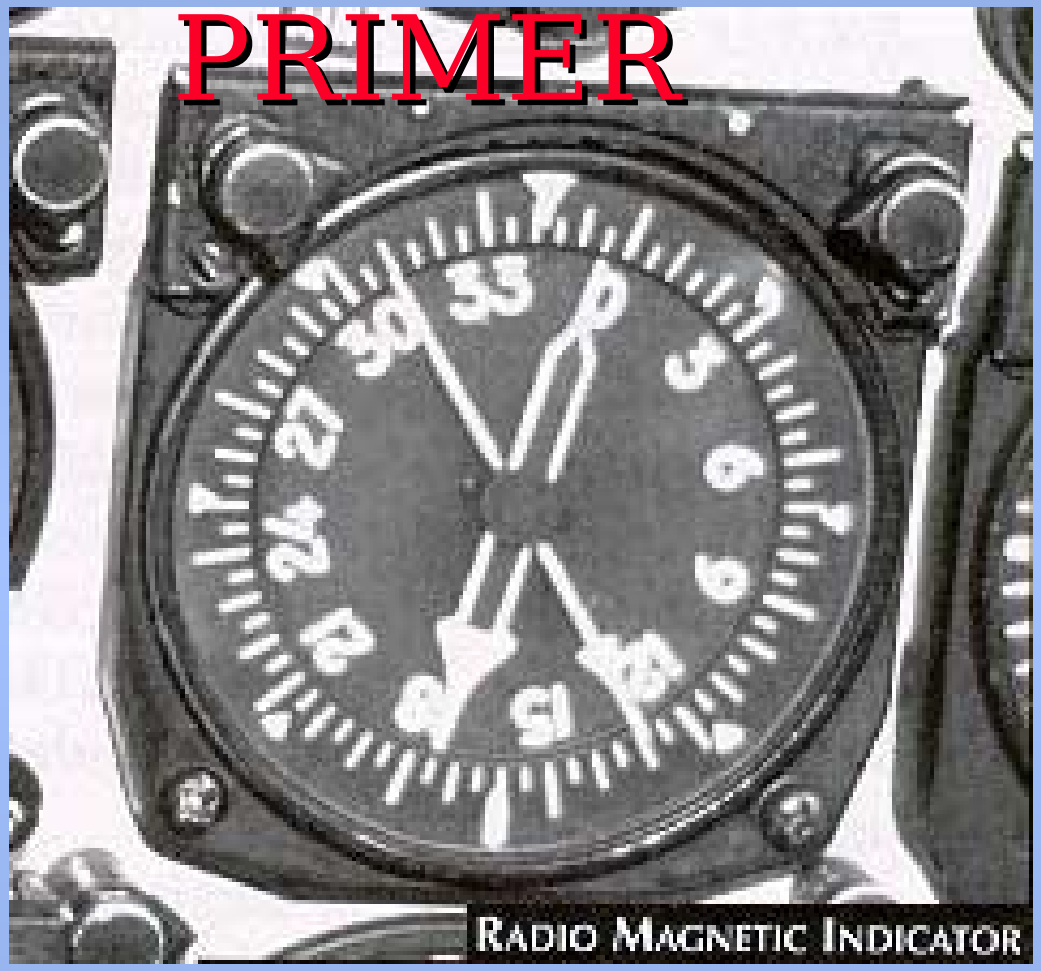
FINAL APPROACH

- Published Procedure-Jeppesen chart
  - Non-precision, double NDB approach
  - Jeppesen use approved by Wing to fly to published minimums-against AFI requirement
- Need 2 Automatic Direction Finders (ADF)
  - One for course guidance from KLP
  - One for identifying missed approach at CV
  - CT-43 only had one ADF
- Crossed KLP: too fast to configure and without clearance--should have circled

INSTRUMENT APPROACH PROCEDURE



RMI PRIMER



(RMI)

HEADING: 340° COURSE: 355°
NON-DIRECTIONAL BEACON AT: 175°

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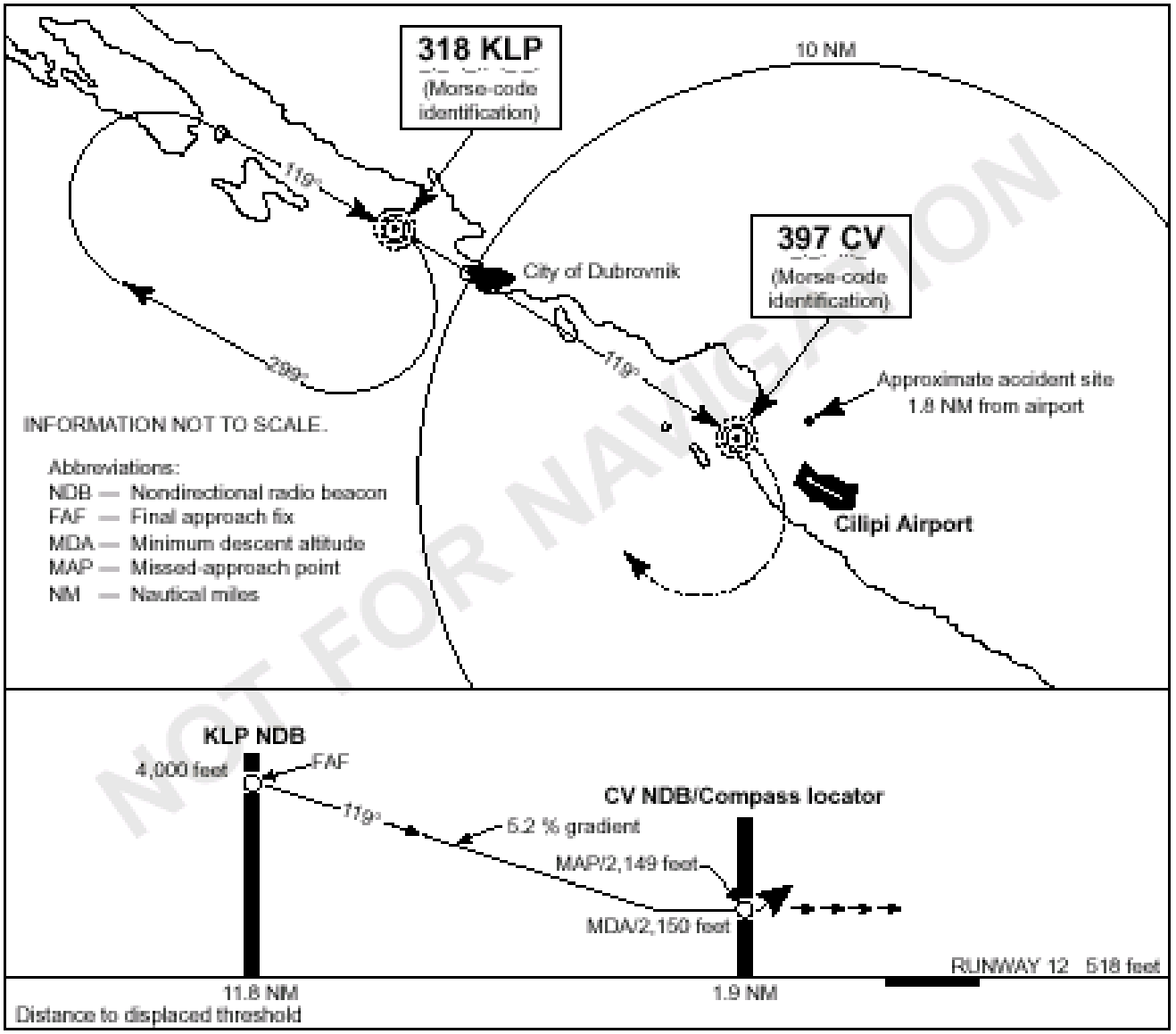
Illustration of NDB Approach to Runway 12, Cilipi Airport, Dubrovnik, Croatia



NOT FOR NAVIGATION

Source: Adapted from *Accident Investigation Board Report United States Air Force CT-43A 3 April 1996 Dubrovnik, Croatia.*

This FSF-produced illustration is provided for educational purposes only. This illustration is not approved or intended for navigational purposes by any government or nongovernment entity, including but not limited to civil aviation authorities and commercial companies.

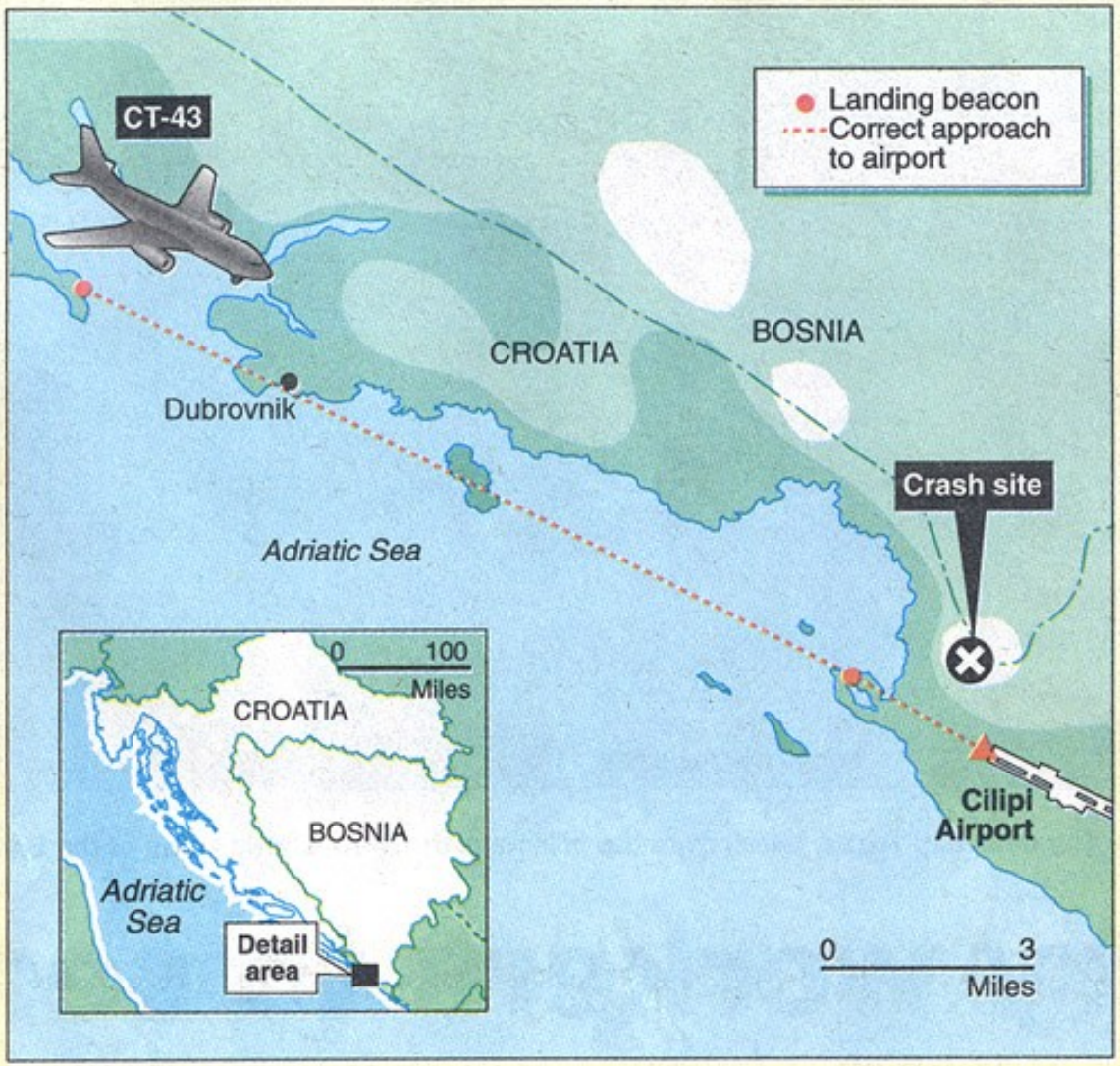
Figure 2

THE MISHAP

- Descended to minimum decent altitude
- Maintained course guidance from KLP
  - However, flew 110º course, not 119º
  - Reason unknown, but not the critical point …
- Had no way to determine missed approach point to execute a missed approach
- Continued approach beyond missed approach point until impact with mountain

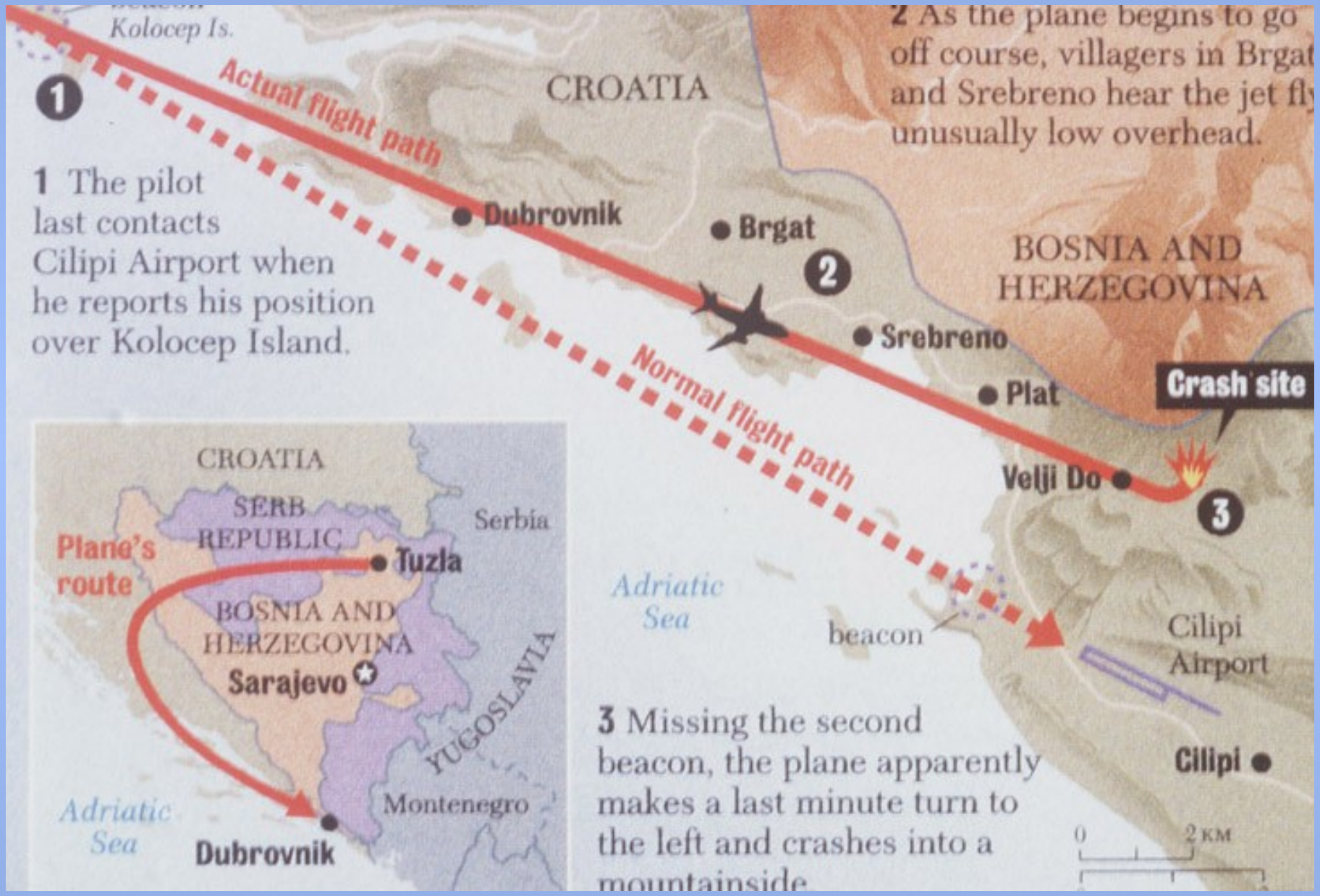
The CT-43 crash

The Air Force CT-43 that crashed April 3 near Dubrovnik, Croatia, should have taken this approach to the Cilipi Airport.



Source: Jeppesen Sanderson Inc.

ATPCO/Lamont W. Harvey


Kolocep Is.
1
Actual flight path
CROATIA
2 As the plane begins to go off course, villagers in Brgat and Srebreno hear the jet fly unusually low overhead.
1 The pilot last contacts Cilipi Airport when he reports his position over Kolocep Island.
Dubrovnik
Brgat
2
BOSNIA AND HERZEGOVINA
Srebreno
Normal flight path
Plat
Crash site
Velji Do
3
CROATIA
SERB REPUBLIC
Serbia
Plane's route
Tuzla
BOSNIA AND HERZEGOVINA
Sarajevo
YUGOSLAVIA
Adriatic Sea
Montenegro
Dubrovnik
Adriatic Sea
beacon
Cilipi Airport
3 Missing the second beacon, the plane apparently makes a last minute turn to the left and crashes into a mountainside
Cilipi
0
2 KM

The STARS and STRIPES

Vol. 54, No. 353 50¢ Thursday, April 4, 1996 D 8693 A

Commerce chief Brown's plane crashes in Croatia

S&S: Susan Marie Carl

Secretary of Commerce Ron Brown (front) toured the Thermoelectric Power Plant Tuzla, the city's largest industrial plant, Wednesday. He left Tuzla for Dubrovnik, Croatia, later in the day, and his plane crashed during the flight.

Wreckage, bodies found on coast

From staff and wire reports

A plane carrying Commerce Secretary Ron Brown crashed a few miles outside Dubrovnik, Croatia, in stormy weather Wednesday, administration and European sources said.

Croatian officials said the tail section of Brown's Air Force plane was discovered on the Croatian coastline and four bodies had been found.

There was no indication that hostile fire was involved.

White House press secretary Mike McCurry could not confirm that Brown's plane had crashed, but said search and rescue operations were under way both on land and in the Adriatic Sea.

"The chances of anyone surviving that are slim to none," said a U.S. defense official, speaking on condition of anonymity.

Croatian President Franjo Tudjman, interviewed on CNN, said the plane had crashed into a hillside near the sea and that he had sent confirmation to President Clinton.

Brown, 54, was leading a delegation of American business executives from a dozen companies, but it was not known whether any of them were on the plane. Administration officials said the passengers included two Commerce Department aides.

A diplomatic source in Europe said that Brown's plane went down near Dubrovnik and that there were 12 passengers on board. Defense Secretary William Perry, traveling in Egypt, said officials had "no evidence at all as to what caused it to go down."

Brown, the most prominent black in the Clinton ad-

See CRASH on Page 2

A
31149

SEARCH, RESCUE, AND RECOVERY

- A Complex, Multinational, Multi-organizational Effort
  - Local authorities, local ATC, national ATC, NATO ATC, Combined Air Ops Center, NATO aircraft, Special Ops, Support agencies, and a cast of thousands …
- Remains Recovery
  - Executive Agent: US Army
  - Forward deployed mortuary unit from US
  - Remains processing: field morgue

CROATIA
SERB REPUBLIC
SERBIA
Tuzla
BOSNIA AND
HERZEGOVINA

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U.S. AIR FORCE

U.S. AIR FORCE

INVESTIGATION RESPONSE

- Initial Safety Investigation Response
  - Not the same as search and rescue response
  - Ramstein deployed team: OG/CC (President), safety officer, pilot member, maintenance officer, flight surgeon and techs, admin, etc
    - Medics worked with mortuary team/others at site
  - Ramstein home team: led by safety office
    - Assisted death notifications, secured records, began interviews

INTERIM SAFETY BOARD ACTIONS

- AFI 91-204, 7.3.9.1
- Preserve Perishable Evidence: video, photos, TOX, labs, X-rays, witness statements, medical/dental records, histories
- Preserve Nonperishable Evidence at Site
- Contact AFIP (DSN 285-0000, Com 301 319-0000, 800-944-7912)
  24 HOUR NUMBERS!

INVESTIGATION ORGANIZATION

- Highest Level Decisions
  - Accident Investigation Vs Safety Investigation
  - Assembled Safety Investigation Board (SIB) became an Accident Investigation Board
- Started With Traditional SIB Organization:

  President, Investigating Officer, Medical Officer, Maintenance Officer, etc.
  - Added legal team and many technical advisors
  - Included NTSB and FAA investigators

Space-A travel: Get ready for long lines

AIR FORCE TIMES

The Independent Weekly

56th Year, No. 38 April 22, 1996 $2.25

EXCLUSIVE

A look at revised rules on adultery and fraternization

THOUSANDS ARE ELIGIBLE FOR NEW MEDAL

UNRAVELING A MYSTERY

Why the CT-43 crash is raising so many questions about black boxes, pilot experience, the ousting of a commander, pressure on pilots, a suicide, Groom Lake and much more

#3X33BLD 5-DIGIT 09123
#0036319820# P17 AIR-E
OD 78 #4331 CCF97
MAJ DONALD R YOHO
PSC 9 SOX 1756
APO AE 09123

ACCIDENT VS SAFETY INVESTIGATION

Safety

- AFI 91-204
- Prevention
- Privilege
- Facts, Findings, Causes, And Recommendations
- No Legal Sufficiency Required
- Minority Opinion Allowed

Accident

- AFI 51-503
- All Purposes
- Public
- Facts, Opinion As To Cause And Factors--No Rec
- Evidence, Chain of Custody, Legal Sufficiency
- One Opinion--The President's

MEDICAL CONTRIBUTIONS

- Team Leader for all Life Sciences
  - Technical advisors included human factors, search and rescue, aircraft survivability
- Mortuary Affairs/AFIP Liaison
- Initial Search and Rescue Fact Finding
- Survivability/Life Support Issues
- Crew Medical Qualifications, Lifestyle and Crew Rest Analysis
- Human Factors Analysis
- Follow-up With Families

Hotel Croatia, Cavtat

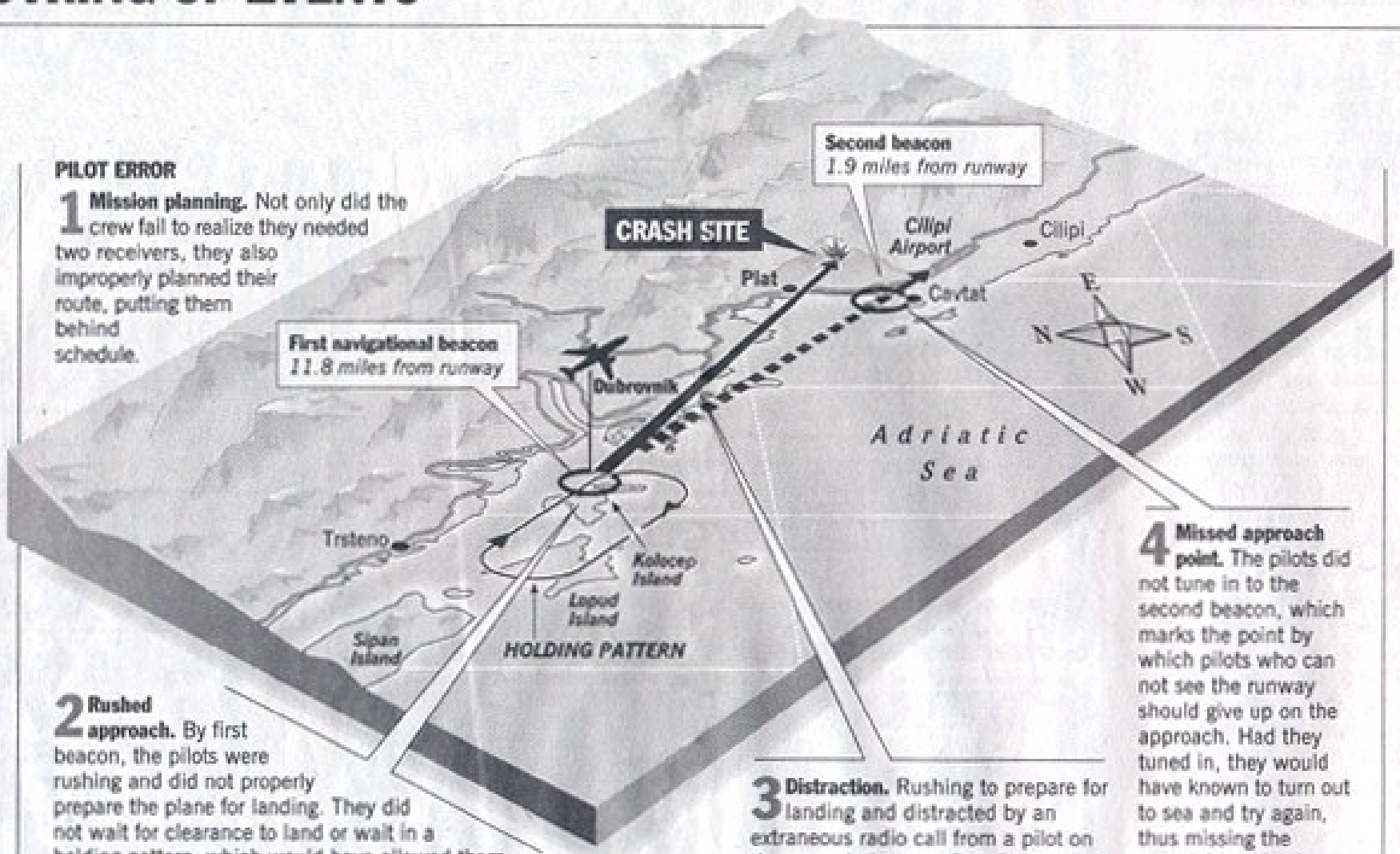
Cavtat

Dubrovnik on the Adriatic

CAUSE

- Command
  - Failed to comply with AFI--authorized use of Jeppesen charts without proper review
  - Failed to provide theater-specific training
- Aircrew
  - Failed to properly plan--did not recognize need for 2 ADFs and improperly planned the route
  - Rushed approach
  - Failed to identify the missed approach point
- Improperly designed approach
  - The correct minimum decent altitude would have taken aircraft over the impact mountain

STRING OF EVENTS



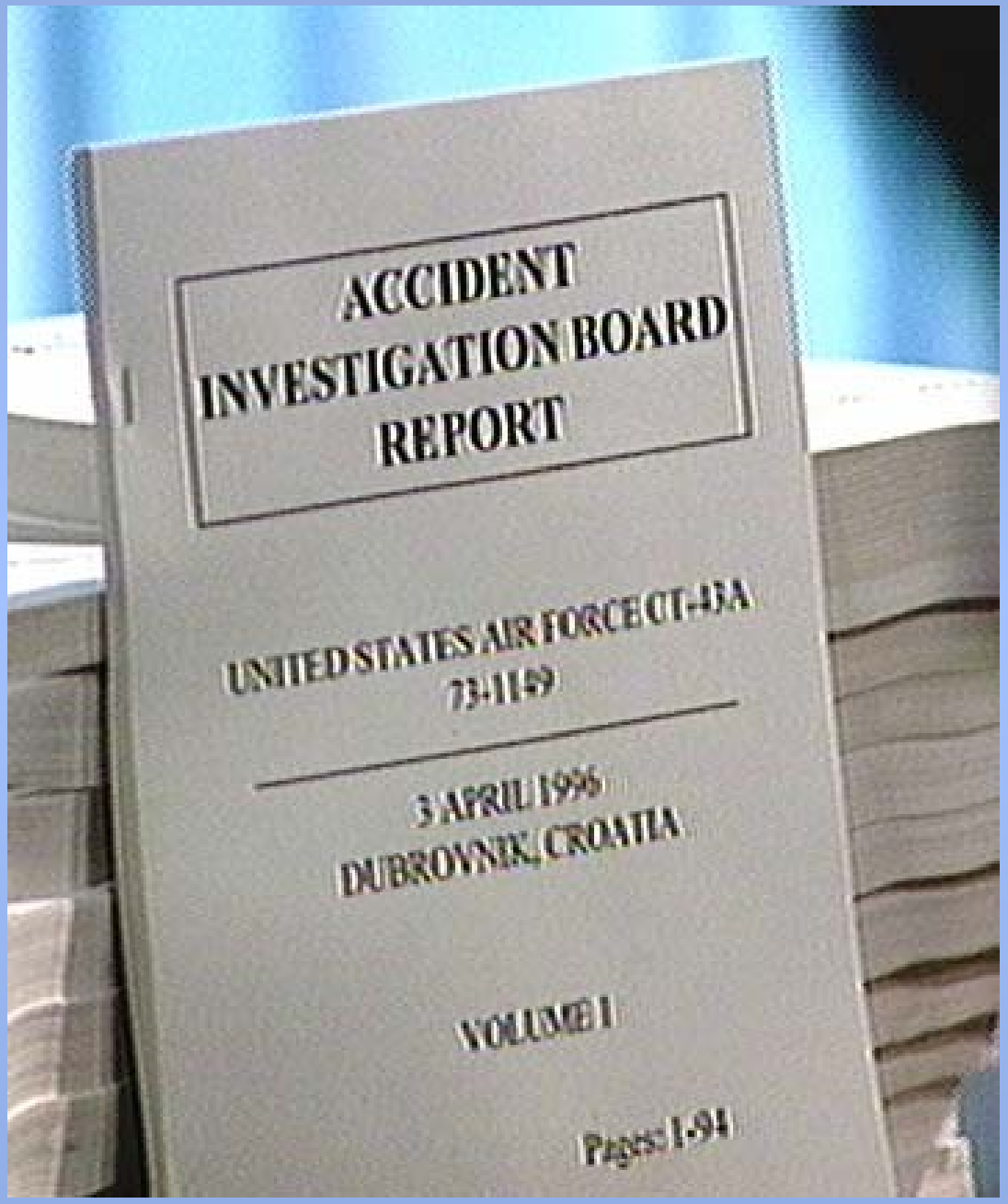
PILOT ERROR

1 Mission planning. Not only did the crew fail to realize they needed two receivers, they also improperly planned their route, putting them behind schedule.

2 Rushed approach. By first beacon, the pilots were rushing and did not properly prepare the plane for landing. They did not wait for clearance to land or wait in a holding pattern, which would have allowed them to slow down and lower the landing gear and flaps.

3 Distraction. Rushing to prepare for landing and distracted by an extraneous radio call from a pilot on the ground, the crew flew 9 degrees to the left (northeast) of the correct course.

4 Missed approach point. The pilots did not tune in to the second beacon, which marks the point by which pilots who can not see the runway should give up on the approach. Had they tuned in, they would have known to turn out to sea and try again, thus missing the mountain, which is one mile past the beacon.


ACCIDENT
INVESTIGATION BOARD
REPORT
UNITED STATES AIR FORCE CT-43A
73-1149
3 APRIL 1996
DUBROVNIK, CROATIA
VOLUME I
Pages: 1-94

LESSONS LEARNED

- Don’t Answer the Phone!
- Boy Scout Motto: Be Prepared
- Keep Passports Current
- Be Careful: Dangerous Environments
- Get SAR, Survivability, Human Factors Experts Involved ASAP
- Use FAA/NTSB Resources

INVESTIGATION ESSENTIALS

- Preparation
  - AFIs, Other Guidance And Procedures
  - Deployment-Like Personal Preparation
- Orders
- Resources--Know Them, Use Them
- The Hand-Off From Initial Team
- Team Physician Role

SAFETY INVESTIGATION RESOURCES

- AFI 91-204, Safety Invest & Reports (May 01)
- AFPAM 91-211 USAF Guide to Aviation Safety Invest (July 2001) http://afpubs.hq.af.mil/
- Electronic Life Sciences Report and Help http://www-afsc.saia.af.mil/AFSC/RDBMS/Flight/sefl/lifedown.html
- AFSC (DSN 246-0830, Com 505 846-0830)
- Local Worksheets/Forms for Histories
- Society of USAF Flight Surgeons *Aircraft Mishap Investigation Handbook* (BROOKS HERITAGE FOUNDATION, PO BOX 35362, BROOKS AFB, TX 78235, (210) 531-9767)

THE AFTERMATH

- AF Actions--Legal and Administrative
- Next Of Kin Special Briefings
  - Several months after release of report
  - Opportunity for families to further discuss concerns and ask questions about the report
  - Closure
- Litigation
  - Accident investigation preserves evidence
  - Investigators may be asked to testify--limited

CNNemPortugues.com
Apresentando CNNemPortugues.com!

Map maker sued in Ron Brown plane crash

April 3, 1998
Web posted at: 10:34 a.m. EST (1534 GMT)

Brown

DENVER (AP) -- The families of some of those killed when Commerce Secretary Ron Brown's plane crashed have sued Jeppesen Sanderson, claiming the Colorado company's map used by pilots put the plane on a collision course.

The April 1996 crash of the plane into a mountain near Dubrovnik, Croatia, and the subsequent deaths were caused by the "defective, unreasonably dangerous and unsafe condition" of the Jeppesen chart, the lawsuit claims.

The lawsuit, filed in U.S. District Court in Denver Thursday, also claims "the Jeppesen chart listed a minimum descent altitude for the approach which was too low and put ... the aircraft on a collision